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UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**
JULY 1948

EROSION CONTROL PRACTICES DIVISION

Report of Committee on Emergency Erosion Measures, Great Plains Agricultural Council - H. H. Finnell, Amarillo, Texas.- "The committee wishes to present a report divided into two parts. The first, a brief summary of existing emergency wind erosion conditions in the Great Plains, and the location of potential threats, followed by the second, an outline of recommendations proposed for the adoption of the Council.

"The emergency with which we are to be concerned is the one we already have. It is in the border area of sandy lands of about five counties extent in west Texas, west and southwest of Lubbock and extending over into Roosevelt and Curry Counties of New Mexico. Two years ago about 1,200,000 acres of cropped land fell into a blowing condition. The soil blowing expanded until this year approximately 3,800,000 acres were seriously affected. Regaining control over this has depended on the getting of adequate cover crops to growing during the present summer season.

"Reports during the spring showed some localities had as much as 34 days of damaging wind erosion with 17 of them developing into major dust storms.

"Present prospects are for a worse time of it next year because summer crop stands have failed to survive the cutting sand through the last chance planting period just ended.

"In Terry County about half the cultivated acreage is destroyed and estimates for the area as a whole run up to one-third destroyed. Land which was blowing last spring and goes through this year without gaining new protection stands a good chance to be abandoned after a worse season of blowing next spring. Some of this land has had a pretty short crop producing experience; it was plowed up after the start of World War II.

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** All research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

"Leaving this sandy row crop country, the extreme southwest end of the winter wheat area extending from about Amarillo, Texas to Clovis, New Mexico did not share in the big 1948 wheat crop to the same extent as in 1947. Abandonment of the crop started 3 months before harvest and in small localities ran as high as one-third to one-half the acreage seeded after wheat. The few summer fallowed fields only made satisfactory yields. Happily the bulk of this abandoned wheat acreage was switched over to sorghums.

"Coming northward from amarillo the 1948 wheat was progressively better with local exceptions. Hence no apprehension is felt for possible widespread blowing in this wheat farming area, this coming spring. In most of the well established southern winter wheat area two successive crop failures are considered necessary to create an emergency condition. However, due principally to the character of the soil, Cheyenne and Kiowa counties, Colorado constitute a vulnerable spot where it is feared a single crop failure would cause trouble.

"As for the general area from Southwest Nebraska down across western Kansas and the Panhandles of Oklahoma and Texas, I can report from a windshield survey made while driving across country to this meeting the following observations:

"Out of 1667 fields tabulated:

- 25.6% were bare of surface protection,
- 13.6% had summer crops growing on them,
- 34.6% had received stubble mulch tillage,
- 26.2% had small grain stubble still standing.

"That is a very sound condition for this time of the year, from the standpoint of possible wind erosion hazard next spring. Only one field out of four is depending entirely on the success of the fall wheat sowing for ground cover. Quite a large proportion of these were evidently summer fallowed.

"No considerable areas of potential hazard for 1949 are reported from any of the northern plains states.

"It is anticipated that future emergencies may arise out of both economic and seasonal conditions beyond the control of farmers. We have in mind such things as a drop in prices, a long dry spell, low prices followed by drouth, drouth followed by low prices or both at the same time.

"In order to be prepared for erosion and land-use problems brought on by any of these conditions, the committee recommends that the Council adopt an aggressive program of preparation involving both educational and research activities outlined as follows:

1. A rapid speeding up of studies of land-use experience in all parts of the Great Plains to be used as a basis for a more exact and convincing land classification than is now available in questionable areas. It is very urgent that this be provided before widespread emergency conditions again prevail.

2. Special emphasis in educational effort to encourage farmers to provide themselves with large reserves of cash.

3. Special emphasis in educational effort to encourage farmers to maintain adequate reserves of seed and feed.

4. Further research in developing better mechanical methods of wind erosion control for each land type in the absence of vegetative cover.

5. Studies of the best methods of handling the problems of abandoned crop lands.

6. Develop methods of tax adjustment designed to increase taxes on lands broken out for more intensive uses and to decrease taxes on lands put back to grass.

7. Further research on more economical and more dependable methods of putting land back to grass."

Study of Azotobacter in Nebraska Soils - F. L. Duley, Lincoln, Nebraska. - "Mr. Curtis Johnson, a graduate student in soil microbiology, has completed a Master's Thesis on Azotobacter. He received his M. S. Degree at the close of the summer session. The results of his studies indicate that Azotobacter are not very abundant in the soils of eastern Nebraska. They were found in greatest numbers in some of the badly eroded soils in the central part of the State. On these areas, however, they do not appear to be supplying much nitrogen, since the productivity and nitrate content is very low as compared with similar land where sweetclover has been grown."

Field Demonstration on Farm Where up-to-Date Methods are Being Used - F. L. Duley, Lincoln, Nebraska. - "On July 23 a field demonstration was put on in Polk County by the Soil Conservation District, the County Agent, and the Osceola Chamber of Commerce supplying a barbecue lunch at noon. An estimated 1500 people attended this meeting, which was held on the George F. and Bruce Anderson farm. The Andersons have the most up-to-date methods in use over much of their farm. Most of the bottom land is irrigated with water pumped by electric pumps from the Blue River.

"The upland is in a system where sweetclover and wheat rotation is used in a stubble-mulch system. The land is also terraced. This land withstood an 8-inch rain falling in about 4 hours during the last week of June. There was almost no visible erosion on land having this treatment. Mr. Anderson has almost eliminated the use of the moldboard plow except for terrace construction and maintenance."

The Influence of Winter Cover Crops on the Yield of Sweet Corn -
O. R. Neal, New Brunswick, New Jersey.-"Numerous studies here and elsewhere have shown that winter cover crops are effective in reducing soil and water losses. These reductions are not limited to the winter season but also carry over through the cultivated season after the cover crop is plowed down. Several different cover crops are satisfactorily effective from the standpoint of reductions in runoff and erosion. The choice of a cover crop to be used may thus depend upon the influence it exerts on the growth and yield of cultivated crops. A comparison of rye, ryegrass, and a ryegrass-vetch mixture is under way at the Marlboro station. Average yields of sweet corn for a 3-year period following each of these winter cover crops are shown in the following tabulation.

Winter Cover	Yield
	No. 1 ears/acre
Rye	9120
Ryegrass	7930
Ryegrass and vetch	11330

"Considering rye cover as a standard treatment, ryegrass had reduced the yield of sweet corn while a ryegrass-vetch mixture has brought about a considerable yield increase. The increase with vetch may be related to nitrogen fixation, but it seems improbable that any large amount of fixation occurred during this short period of growth over the winter season."

Crop Rotations in Relation to Erosion and Runoff on Wheatland -
Glenn M. Horner, Pullman, Washington.-"Soil and water losses from the crop rotation plots during the past erosion season are summarized below. These results show that the system of winter wheat and summer fallow caused the most severe erosion, while an eight-year alfalfa-grass rotation reduced the losses to the lowest value.

Effect of Crop Rotations on Erosion Losses

Crop Rotation	Erosion Losses Winter 1947-48	
	Soil (T/A)	Water (Inches)
Alfalfa and grass 4 years-winter wheat-		
winter wheat-peas-winter wheat	1.3	0.33
Sweetclover and grass 2 years-winter		
wheat-peas-winter wheat	3.8	0.73
Winter wheat-peas for green manure	5.8	0.99
Winter wheat-Hubam clover for green manure	4.9	0.87
Winter wheat-peas	4.8	1.12
Winter wheat-fallow	9.7	1.63

Crop Sequence in Relation to Wheat Yield and Meadow Stand - D. D. Smith, Columbia, Missouri.-"The wheat yield following soybeans on the sequence study plots averaged 38 bushels per acre, following oats 28 bushels, and following corn 22 bushels. The soil treatment was the same on all these plots. More vigorous meadow stands were secured as a result of the thinner stand of wheat following corn. First-year meadow plots have produced the second cutting of grass and legumes, with the average yield for the two cuttings near 3 tons per acre. Similar yields of alfalfa-brome grass were secured from two cuttings on the deep limed and fertilized plots. Yields of alfalfa without the brome averaged about one-half ton per acre less."

Effect of Alkali Salts on Microbial Activity - D. S. Hubbell, State College, New Mexico.-"The first phases of a laboratory study on the effects of alkali salts on microbial activity and aggregate formation has been completed. The data indicate that while such neutral salts as Na_2SO_4 and NaCl have no effect on either microbial activity or aggregate formation, base salts such as NaOH , Na_2CO_3 , and NaHCO_3 , increase the growth of fungi tremendously. Aggregates formed in the presence of these salts are of the fungal type, and the soil is puddled and impermeable."

1948 Grain Yields were Markedly Affected by Date of Planting - Maurice Donnelly, Riverside, California.-"Harvesting of experimental grain plots from the Haskell fields in the San Geronio Soil Conservation District was completed early in July. Yields of grain from plots undergoing differential cultural treatments will be reported later. An important factor affecting yields the past season was the date of planting. These dates may be classed into three groups: (1) Grain planted in dry soil before rains of early December; (2) grain planted in wet soil after the rains of early December; and (3) grain replanted in January on fields where the initial 'dry' planting showed poor germination. Groups 1 and 2 include practically all of the commercial plantings observed in the grain-growing areas.

"Grain planted early in dry soil gave yields that are rated as poor to fair. Some of the earliest commercial plantings of this group were failures and were not harvested. The principal causes of low yields in this group were (a) poor germination, (b) heavy weed infestation, and (c) burning of the plants by drought. Yields in this group were of the order of 4 to 10 hundred pounds of barley per acre.

"Plantings of the second group, made in wet soil after the rains of early December, gave the best yields. Germination was good, weed infestation was limited. In addition, the plants were so small during the long drought of mid-winter that they resisted burning. Yields in this group were of the order of 12 to 18 hundred pounds of barley per acre.

"At the Haskell fields, the yield of plantings in the third group (replanted in January) was disappointing. The stands were excellent, with few weeds. The plants formed strong stalks, with numerous leaves. However, there was not sufficient soil moisture at the end of the season to permit full development of the heads, which were light. Yields in this group were of the order of 10 to 14 hundred pounds of barley per acre."

Effectiveness of Contouring in Preventing Soil and Water Loss on Eroded Land - C. A. Van Doren, Urbana, Illinois.-"July was abnormal climatologically in that the 6.23 inch rainfall was 100 percent in excess of the Weather Bureau's 45 year average of 3.11 inches and was 96 percent in excess of our 8 year average of 3.18 inches at the plots. Seven storms, producing 5.69 inches of rainfall, caused runoff. The storm of July 15 would classify as a two year (Yarnell) frequency on the basis of 5, 15, and 30 minute rainfall intensities. While this storm was of relatively low rainfall (1.2 inches) and low intensity, it produced the highest peak rate of runoff (4.25 cfs. per acre) that we have recorded on the non-contour corn plot. A runoff rate of 4.1 cfs. per acre was recorded on non-contour corn in 1947 from a 30 year frequency (Yarnell) storm based on the 5 and 15 minute rainfall intensities. This storm would classify as a 6 year frequency for the 30 minute rainfall intensity. In 1947, at the time of the storm, the plots had been disked the preceding day in preparation for planting, while in 1948 the plot was covered with a growth of corn nearly six feet high that afforded some canopy interception and protection to the surface against raindrop impact. Antecedent rainfall and undoubtedly the dominant factor in the production of the high rate of runoff during the storm in 1948.

"Soil and water losses from two selected, runoff producing storms are shown in the following table.

Soil and Water Losses in July 1948 - Contour Farming Study						
Date	Rainfall	Corn		Soybeans		
		Contour	Non-Contour	Contour	Non-Contour	
Soil Losses						
July 15	1.20"	304 lb/A	2073 lb/A	7 lb/A	1531 lb/A	
22	1.00"	333 "	1574 "	4 "	644 "	
Total (7 storms)	5.69"	681 "	4705 "	11 "	2368 "	
Runoff Losses						
July 15	1.20"	.18"	.71"	.01"	.70"	
22	1.00"	.48"	.63"	.01"	.58"	
Total (7 storms)	5.69"	.80"	1.88"	.02"	1.53"	
Runoff, percent of						
July precipitation:		12.8	30.2	3.2	24.6	

"The contoured corn ridges broke down during the storm of July 15 and could not be rebuilt because the height of corn would not permit further cultivation. Despite the fact that only two cultivations were made this year, contouring has been unusually effective."

Root and Top Growth Relationship of Some Fall Planted Biennial Sweetclovers Growing on Austin Clay Soil - J. R. Johnston, Temple, Texas.-

"Some work was done during the month on the root-top relationship of some 1947 fall planted biennial sweetclovers. Data for four biennial varieties are given in the table that follows. These data show that the evergreen variety was the superior variety for tonnage of growth, both roots and tops. The Madrid and Spanish varieties planted in this test came up to a very poor stand; hence they were not included in the root-top studies this year.

Sweetclover Variety	Green Growth Per Acre		
	Roots	Tops	Roots & Tops
	Tons/A	Tons/A	Tons/A
Evergreen	2.34	7.06	9.40
Williamette	2.10	5.97	8.07
Common bien. white	1.61	5.16	6.77
Common bien. yellow	1.82	4.48	6.30

Effect of Grazing Rates on Roots of Pasture Plants - O. K. Barnes, Laramie, Wyoming.-"In May, 1948 Dr. A. A. Beetle's Range Management class made some root studies at the Archer Field Station under the direction of Dr. John P. Reed of the Botany Dept. These studies were made on the duplicate light and heavy grazed native range pastures. They were made for the purpose of training the class and to explore the possibility of more comprehensive studies later.

"The procedure was as follows: 6 trenches were dug, 2 on one light grazed pasture and 1 on the duplicate pasture, likewise 2 were dug on one heavy grazed pasture and 1 on its duplicate. The trenches were approximately 2 feet deep by 4 feet long. A frame 3 by 1-1/2 feet divided into squares 6 by 6 inches was placed on the face of the cut and all roots counted for the first, second and third 6 inch depths.

"The summary of these root counts made by Dr. Reed show the following differences:

	<u>4 years of light grazing</u>	<u>4 years of heavy grazing</u>
Upper 6 inch zone	267 per sq. ft.	132 per sq. ft.
Second 6 inch zone	99	60
Third 6 inch zone	32	26

Grazing Sweet Sudan Grass - C. J. Whitfield, Amarillo, Texas.-

"Sweet sudan, seeded in 40-inch rows on June 7 and 8, was ready for grazing by July 16. Fifty head of 800-pound steers are now grazing on a 45-acre field which is expected to furnish grazing for them until October. The sudan has a good start and it looks as if it would furnish ample grazing for a heavier stocking rate."

Diagnosing the Need for Earthworm Management - Henry Hopp, Beltsville, Maryland.-"The Region I Nursery Division requested us to determine whether soil difficulties they are experiencing at their Big Flats, N. Y., nursery might be corrected by earthworm management. The soil is mostly silt loam; after 8 years of intensive use ponding and compaction have become severe despite liberal green manuring. Clarence Slater and I made the examination on August 12 and 13. The method used to assess the possibility of earthworm management for correcting this soil problem may be of interest to other technicians, and will therefore be described.

1. Determine if the problem is due to soil structure decline. Infiltration and aggregate stability tests were made in a well fertilized sod area and on an area that had been clean cultivated for several years, with the following results:

Treatment	Infiltration (In./Min.)	Aggregate Stability (Percent)
Sod	.60	56
Clean cultivation	.08	20

These tests indicated that the cultivated area had lost almost all its water absorbing capacity and much of its aggregate stability.

2. Determine if the decline in structure is associated with the earthworm population. On the sod area, the earthworm population was 31 per square foot to a depth of 8 inches. On the bare area, the earthworm population was only 4 per square foot. We have generally considered that 10 worms per square foot is a sufficient population to affect the structure of the soil significantly. Hence, it appears that the earthworms in the sod area could very well have been an important factor in its good physical condition, while on the bare area the count is too low to expect any earthworm effects.

3. Determine if the earthworms can be maintained by late fall protection. For this test, it would be best to find a cultivated spot that had been protected with a mulch cover over winter. None was available at the nursery so we did the next best thing, which was to locate an area of soybeans and sudan grass that had been in sod cover last winter. This was compared with an area of the same vegetation that had been bare last winter. The results were:

Cover last winter	Infiltration (In./Min.)	Aggregate Stability (Percent)	Earthworms (No./Sq Ft.)
None	.01	20	3
Sod	.82	82	21

"These three tests are not conclusive if considered only by themselves. But when evaluated in light of our published research, they indicate that the maintenance of the earthworms on this tilled land by adequate winter protection may be the solution to the problem."

Earthworms Increase Infiltration of Soil - Henry Hopp, Beltsville, Maryland.-"In last month's report, we called attention to a controlled barrel experiment that has shown remarkable increases in yield when earthworms were present. We have made infiltration tests on the soil in these barrels, with the following results:

Cover during the Winter	Cover this Summer	Topdressed with Fertilizer	Infiltration (In./Min.)	
			Inoculated with Living Worms	Not inoculated with Living Worms
1. None	None	+	.00	.00
2. Sod, clippings left on surface	Sod	-	1.42	.30
Sod, clippings left on surface	Sod	+	.81	.25
3. Sod, clipped closely	Sod	-	.10	.02
Sod, clipped closely	Sod	+	.17	.45*
4. Mulch	Mulch	-	1.54	.00
Mulch	Mulch	+	4.80	.00

* Infested by ants this spring.

"The data show a remarkable effect of worms on infiltration where suitable cover conditions were maintained over winter for their survival (2 & 4). Where no cover was maintained during the winter so that the earthworms would be killed, the inoculated soil showed as poor infiltration as the uninoculated soil (1 & 3). Note that the ant holes aided infiltration in the one barrel that they happened to have infested. The mulched soil showed a most striking effect. Mulch without worms resulted in severe water-logging. The water failed to enter the soil and the mulch decreased evaporation; a veritable quagmire resulted. But mulch with worms gave the highest infiltration rate of all. These results suggest that the oft-reported benefits of mulch on infiltration may actually be due to the earthworms that are present in the soil rather than directly to the mulch. These results will appear in an article that Clarence Slater and I have prepared for Soil Science."

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.--"Rainfall of 3.44 inches for the month was mainly supplied in three storms of 0.66, 0.80, and 1.39 inches. Each of these storms caused runoff and soil loss on all plowed cornland watersheds. Mulch corn watershed No. 188 yielded runoff in only the last two storms. The following table gives runoff and erosion on cornland watersheds for the month:

Table 1.--Runoff and soil loss from corn watersheds, July 1948

Date	Rainfall: (inches)	Runoff (inches)				Soil loss (tons per/A)			
		watershed 1/				watershed 1/			
		106	121	191	188	106	121	191	188
July 12	0.28	0.004	0	0	0	0.02	0	0	0
16	.66	.013	.001	.062	0	Trace	Trace	Trace	0
22	.80	.164	.056	.287	.010	1.91	.40	.35	0
27-28	1.39	.532	.351	.571	.037	4.74	1.15	.52	.03
Total for the month	3.44	.713	.408	.920	.047	6.67	1.55	.87	.03

1/ Watershed: No. 106, slope 14.3%, plowed, cultivated, straight rows
 No. 121, slope 15.8%, plowed, cultivated, contour
 No. 191, slope 9.4%, plowed, no cultivation, contour
 No. 188, slope 9.2%, mulch, no cultivation, contour

"Mulch corn watershed has continued to give the best soil and water control. A striking contrast is apparent in the runoff from the two plowed contour watersheds, 121 and 191. The former is cultivated for weed control with the second and last cultivation on June 29. On the latter, 2,4-D is used with no cultivation. Runoff for the month of June on No. 121 totaled 0.68 inch and that on No. 191 was 0.51 inch. Now in July the story is reversed - runoff on No. 121 was 0.408 inch and that on No. 191 was 0.920 inch. Loosened soil on the cultivated watershed No. 121 has absorbed more rainwater than the compacted soil on the non-cultivated watershed No. 191. Analysis of the hydrographs will reveal more details on the reasons for these differences.

"Soil loss on the uncultivated corn watershed, No. 191, totaled less than that on the cultivated corn watershed, No. 121. Both areas were plowed. The latter one was steeper than the former. If the erosion on the flatter slope (uncultivated) was adjusted for degree of slope to No. 121, it would total:

$$0.87 \frac{(15.8)^{1.5}}{(9.4)} = 2.05 \text{ tons per acre}$$

"This is over 30 percent greater than that on the cultivated corn watershed.

"These results throw some light on the question, 'Can we give up the old practice of cultivating corn and get by with the use of chemicals alone?'"

Hydrologic Studies - John A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska. - "Runoff occurred on July 9, 18, and 28 on all the cultivated and mixed-cover watersheds. The 9- and 10-day intervals between rains producing runoff was well spaced and minimized the amount of runoff. The total rainfall for July was 4.18 inches, or 1.13 above long time record.

"Following is the peak rates of runoff on the 4-acre corn watersheds under various land-use practices with other pertinent rainfall data:

Table 1.--Peak rates of runoff on the 4-acre watershed
under various land-use practices

<u>CORN STRAIGHT ROW</u>			
Peak Rates of Runoff in Inches Per Hour			
	July 9	July 18	July 28
	0.55	2.57	0.38
	<u>.92</u>	<u>4.00</u>	<u>.56</u>
Ave.	.74	3.28	.47
<u>CORN CONTOURED</u>			
	.10	1.27	.08
	<u>.09</u>	<u>2.27</u>	<u>.54</u>
Ave.	.10	1.77	.31
<u>CORN SUBTILLED</u>			
	.09	.002	.002
	.37	.33	.73
	<u>1.11</u>	<u>3.13</u>	<u>.56</u>
Ave.	0.52	1.15	0.64

Table 2.--Rainfall data from meteorological station-recording rain gage

	: July 9	: July 18	: July 28
Total rain-fall inches	1.69	.93	.76
Duration of rain	6 hrs.	16 min.	4 hrs.
Max. 10-min. intensity (in/hr.)	2.76	4.44	2.22
Max. 5-min. intensity (in/hr.)	2.88	6.00	2.76

"On July 18 the average peak rates from the plain pasture plots was 0.34 inch per hour, 0.20 inch per hour on the eccentric disked plots, and 0.02 inch per hour on the furrowed plots."

Hydrologic Studies - N. L. Stoltenberg, Lafayette, Indiana.-

"The following table represents data obtained from rains of 4/5-7-48. It would certainly be a big job for our personnel here if we had to replace the soil that has moved on during this one period.

"Please note that the conservation treatment saved half a ton of soil per acre and, at the same time, those acres are furnishing considerably greater yields. Analyses for potassium and calcium when completed will permit calculation of present day values of nutrient loss.

Table 1.--Erosional losses from watersheds under prevailing and conservation treatment
Rains of 4/5-7/48 averaging 3.5 inches
Lafayette, Ind.

Treatment	:W.S.D.#:	Crop	Total loss #/acre				
			Total solids	Organic matter	Nitrogen	Sol. P as P ₂ O ₅	Av. run-off, in.
Prevailing	4 & 12	Fallow	1,640	106	5.5	0.66	1.58
Conservation	2 & 11	✓	600	38	2.2	.24	1.12
Difference			1,040	68	3.3	.42	.46
Prevailing	5 & 8	Wheat ³	1,900	97	6.1	.59	2.02
Conservation	6 & 7	✓	910	56	3.4	.37	1.24
Difference			990	41	2.7	.22	.78

Note: Excellent agreement of data from watersheds under the same treatment.

Hydrologic Studies - G. A. Grabb, Jr., East Lansing, Michigan.-

"Precipitation for the month of July 1948, as measured by the United States Weather Bureau type of non-recording rain gages, amounted to 2.12 inches for the cultivated watershed, 2.75 inches for the wooded watershed, and 1.97 inches for the stubble-mulch plots. This is approximately 68 percent, 89 percent, and 64 percent of the 3.10 inch normal for July for East Lansing, as computed by the U. S. Weather Bureau.

"Earlier in the year, the project supervisor arbitrarily commenced comparing project rainfall with the East Lansing 50-year average instead of the 40-year average. United States Weather Bureau records use a 'normal' rainfall for comparing, and it is felt that this figure should be used. Accordingly, this and future reports will use the following 'normal' rainfalls for comparing purposes:

Jan.	1.82"	May	3.42"	Sept.	2.91"
Feb.	1.90"	Jun.	3.51"	Oct.	2.47"
Mar.	2.35"	Jul.	3.10"	Nov.	2.48"
Apr.	2.58"	Aug.	2.82"	Dec.	2.07"

"As has been indicated in previous reports, the method used on the project of determining a daily normal value of solar radiation is not in general use. However, the weekly mean of daily totals (as used by the USWB) gives reasonably comparable results, just not such a precise pattern. Accordingly, preparation of charts of these weekly means on an annual basis for graphical comparison with the East Lansing normal has been completed for the following stations:

Station	: Latitude:	: Average Total Annual Radiation (gm. cal/sq. cm):	: Years of Record as of 12/31/47:	: Altitude (MSL):
Miami, Fla.	N 25-41	151,840	6	50
Gainesville, Fla.	N 29-39	138,335	3	233
New Orleans, La.	N 29-56	116,435	5	100
La Jolla, Calif.	N 32-50	129,940	6	85
Riverside, Calif.	N 33-58	154,760	3	1,050
Fresno, Calif.	N 36-43	142,715	8	330
Washington, D. C.	N 38-56	123,735	22	397
Pittsburgh, Pa.	N 40-22	101,478	2	1,293
New York, N. Y.	N 40-46	102,565	12	180
Lincoln, Nebr.	N 40-50	137,970	20	1,250
Chicago, Ill.	N 41-47	98,550	13	688
Blue Hill, Mass.	N 42-13	128,115	3	640
Ithaca, N. Y.	N 42-27	111,690	3	953
Twin Falls, Idaho	N 42-29	142,715	10	4,300
Madison, Wisc.	N 43-05	118,260	26	1,009
Mt. Washington, N.H.	N 44-16	-	1*	6,270
Friday Harbor, Wash.	N 48-32	118,265	3	15
Fairbanks, Alaska	N 64-52	78,840	5	500
Mean (omitting Mt. Wash. and Fairbanks)		127,750		
East Lansing, Mich.	N 42-43	102,602	5	844

* Incomplete data

"It will be immediately noted that the annual total of solar radiation received at East Lansing is considerably less than that received at most other stations. In fact, the total for East Lansing is greater only than that for Fairbanks, Chicago, Pittsburgh, and New York, in that order. One might, with justification, immediately discount results at Chicago, Pittsburgh, and New York because of the interception to be encountered from smoke, even though they are located in a comparable latitude. It is interesting to note that Madison and Ithaca, which compare with East Lansing as regards latitude, also compare in regard to total amount of annual radiation. It is also interesting to note the effect of altitude and latitude on these figures.

"A preliminary comparison of these results show that in most of the patterns of radiation, there will be found one or more peaks of maximum radiation with the secondary maximum separated therefrom by a secondary minimum. However, in strong contrast to Kimball's findings (Mon. Wea. Rev. 43:101-1915) the secondary does not necessarily follow the primary maximum, but may precede it.

"It is noted that the record for East Lansing, while varying greatly from the other records, has many points in common with them. East Lansing agrees with Kimball's figures in that the secondary maximum follows the primary maximum which occurs the latter part of June. The secondary maximum found in May on most of the stations having a comprehensive record is not found at East Lansing. May is primarily conspicuous here for its flattened curve. Secondary and tertiary maximums are noted in mid-June and July.

"I. F. Hand notes (Mon. Wea. Rev. 65: 423:37) that the difference between summer and winter values at low latitude stations is far less than at high latitude stations. This is due to the smaller seasonal range in the length of day at low latitudes. Hand attributes (Mon. Wea. Rev. 65: 415-440: 37, and 69: 95-124:41) the wide variation between stations of almost identical latitudes as due to atmospheric pollution, in large part. That part of the solar radiation which passes through the atmosphere is either turned aside from the direct beam and scattered in all directions, absorbed and turned into heat energy, or propagated unchanged into wave-length. The non-selective scattering of radiation by the gases of the atmosphere has been evaluated (W. S. Humphreys, Physics of the Air, 2 ed., 537-546; L. V. King, Phil. trans., A 212, 357-434, 1913; and F. E. Fowle, Smith. Misc. Coll. 69:3, 1918), but the non-selective scattering by atmospheric water vapor has not been evaluated because of its inconsistencies and anomalies. It is felt that the different annual normal radiation pattern found at East Lansing is due, in part, to water vapor from the Great Lakes. However, there occurs to the project supervisor, at present, no suitable explanation of the fact that the annual normal pattern of radiation at East Lansing compares, in general conformity of curve, only with Fairbanks, Alaska. In this connection, it will be noted that Fairbanks is the only non-industrial station (that is, free from smoke pollution) normally receiving less total radiation than East Lansing."

Hydrologic Studies - R. W. Baird, Waco, Texas.--"Insect populations in cotton fields increased very rapidly during the last week of June and the first week of July. The hot dry weather the last 3 weeks has reduced insect activity. Using insect damage counts by the Bureau of Entomology and Plant Quarantine selected cotton fields were dusted with Toxaphenes twice early in this month. Apparently good control of boll weevil and flea hopper was obtained and some control of boll worm."

Runoff Studies - N. E. Minshall, Madison, Wisconsin.--"Precipitation at Fennimore for July was 2.11 inches as compared to a normal of 3.8 inches. The total deficiency since May 20th is 5.5 inches. Oats and corn appear to be very good, but the hay and pastures are short. Temperatures varied from a maximum of 94° on the 6th to a minimum of 46° on the 1st, with a mean of 72° which is near normal.

"For the month precipitation at Edwardsville was 8.50 inches, or more than twice normal. The total runoff on the 50-acre pastured area was 1.83 inches. Rainfall intensities in general were not high, and the maximum rates of runoff for the month were:

W-1.....	0.80	inch	per	hour
W-2.....	.71	"	"	"
W-4.....	.57	"	"	"

"A meeting of the Wisconsin Valley Joint Committee on Hydrology was held at the Hydraulics Laboratory in Madison on July 23 to consider new areas for long-range hydrologic studies. Present at this meeting were:

United States: (G.S.) F. C. Christopherson, Surface Water; F. C. Foley, Ground Water. (C. of E.) Robert Galton, St. Paul; L. A. Carlson, Rock Island; J. W. De Munnik, Duluth; V. G. Goelzer, Milwaukee, (S.C.S.) R. S. Brown, Operations; N. E. Minshall, Research; Wis. Valley Improvement Co.: M. W. Kyler, L. L. Sheerar. State of Wisconsin: (Public Service Comm.) G. P. Steinmetz. (Highway Comm.) V. H. Prockaska. University of Wisconsin: K. F. Wendt, Exp. Station; A. T. Lenz, G. W. Kirkpatrick, Civil Engr. (College of Agric.) F. D. Hole, State Soil Survey. So that a better understanding might be had by the various members of the committee, we had Mr. William DeYoung, the State Soil Scientist, for SCS, divide the State into soils groups, each group of which represented an area having similar runoff characteristics. The soil groups as listed by Mr. DeYoung are given below:

- Ia. Western Rolling Silty Soils underlain by limestone -- Fayette, Tama, Dubuque
- Ib. Western Rolling Silty Soils underlain by sandstone -- Fayette, Gale, Hixton
- IIa. Older Glacial Drift and Outwash Soils
- II. Morainic Glacial Drift Soils -- Miami, Bellefontaine, Clyde, Peat
- IIIa. Red Clay Lands -- Superior, Kewaunee, Poygan
- IIIb. Mixed Red Clay and Limy Drift Soils - Onaway

- IV. Sandy Plains and Hills, Swamps -- Plainfield, Coloma, Scandia, Newton, Peat
- V. Mostly Tight Silty Soils -- Almena, Spencer, Freer
- VI. Rolling Glacial Loams and Sandy Loams
- VII. Northern Lake Superior Red Clays
- VIII. Rolling Glacial Sandy Clay Loams and Sands
- G. Granite Soil Area

"Within each of these areas all present stream-gaging stations which had 75 percent or more of the drainage area in one soil group was tabulated to show the drainage area, the length of the record, and the shape of the area, L/W. After a study of these, a number of new gaging stations were recommended to fill in what blanks appeared in the tabulation. The group expressed itself as being unanimous in recommending a recording rain gage within each drainage basin having an area of less than 100 square miles, especially where the stream-gaging station is of the recording type."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.-

"Mr. Blaisdell completed the analysis of tests made last month on the pipe drop inlet spillway and took moving pictures to record the flow conditions in the structure. Some time was spent in analyzing the results of previous tests. The test setup was revised to put the pipe on a 30 percent slope. No tests had been run on this model at the end of the month."

Drainage Studies - M. H. Gallatin, Homestead, Florida.-"Rainfall for the period has been light, most of the rain during this period has fallen in heavy intense showers. Rainfall for the period for some of our stations for June 1948 and 1947 are as follows:

Station	June 1948	June 1947
E-33 Highlands Water Control Plot	3.60	13.76
Well #5 Cor. Mowry and Redland	5.35	20.77
West Mowry	3.68	17.11
Sub-Tropical Experiment Station	3.38	22.51
Cor. Naranjo and Coconut	6.12	15.94
Farm Life No. of Silver Palm	4.15	14.46

"From the above it will be noted that the rainfall this year is a good bit lighter than for the same period last year. As a result of this low rainfall, the water table for the area is much lower this year than it has been for the past 2 years. On June 28 the water table at Well No. 5, which is read daily, was 2.53 feet above m.s.l. On June 28, 1947 the reading was 5.81 feet above m.s.l., and on June 28, 1946 the reading was 4.23 feet above m.s.l. From the above readings, along with our records of rainfall, it is quite apparent why the water table for the area is low for this period. Water-table readings for the Redland profile were

quite variable, for the Rockland area there has been a gain in our water table averaging about 0.5 of a foot, while for the coastal marl and back country areas the losses range from 0.01 foot to 0.42 foot. For the Mowry Street profile gains in our water table were recorded for all of the wells except Well No. 31. Just east of the Rockland and E-32, about 1-1/2 miles east of the Rockland, the losses were 0.11 and 0.26 foot, respectively. Readings for the Eureka profile were quite variable. Slight losses were recorded on the western end with gains of over a foot for the middle portion of the area. The average gain was much higher in this area than for any other portion of the area.

"Data during this period, where the rain has fallen in relatively heavy showers, follow along with that of a year ago, i.e., on those areas where cyanamide or other higher organic nitrogen fertilizer is being used there has not been the high leaching nor has there been as much fluctuation in level. The losses during this time of the year are greatest for those forms of nitrogen which are readily available. The new trials with the Urea-Formaldehyde compound will be started in July.

"Samples collected in the Miami area show in most cases a slight increase in concentration of chlorides. This rise may be due to the movement of chlorides in the profile to the surface. This rise in concentration might also have been caused by not closing the temporary structures in time. This same thing occurred on the Military canal in the Homestead area earlier in the year. Samples collected in the Homestead area from the Goulds, Military, and North canals show that there has been an overall lowering in the concentration of chlorides. While there has been a drop in concentration east of the structure there has also been a lowering in concentration for the areas west of the structure on the Military and North canals that had been building up in concentration during the past periods."

Drainage Studies - Ellis G. Discker, Raleigh, North Carolina.-

"At last, the widening and deepening of the McRee Canal has been completed for a distance of 7,700 feet. This extends the canal up to the south end of the last experimental plot E. Funds for re-working the canal beyond this point are not available at present.

"The above mentioned portion of the canal appears to be adequate and is a very nice looking job. However, some bank erosion will occur before it will be possible to get a crop of rye grass seeded and established in September. It is planned to plant Kudzu on a portion of the banks in the spring. Recommendations of the writer for leaving a 15 foot berm and cutting the side ditches to canal grade for a distance of 50 feet were not fully complied with and as a result these side ditches are going to cause rapid sand and silt deposits in the canal."

Supplemental Irrigation Studies - James Turnbull, Lake Alfred, Florida.-"The month of July initiated the rainy season and by the end of the month more than 13 inches of rain had been recorded at the experimental grove near Haines City. Also during the month we completed picking operations in the experimental grapefruit block. The yields from the irrigation plots are shown on page 19. It is interesting to note that the irrigated orange plots gave consistently higher yields than did the unirrigated orange plots, even though this year was very wet and no irrigation was required until just before picking time. The increased yield is attributed to increased size of trees due to adequate soil moisture always being available during the last 6 years. Statistically, there are no significant differences between the yields from the individual irrigated orange plots. There is; however, a significant difference between the orange plots receiving 3-1/2 inches of irrigation water per application and the check plots.

"Equally interesting is the reversal of the grapefruit yields, with the unirrigated plots giving greater yields than the irrigated plots. Though the differences are not statistically significant they indicate a trend. The reversal of yields is a direct result of the freeze damage of February 6, 1947, which occurred just before the fruit was set. At that time it was reported that the damage was more severe on irrigated than on unirrigated groves and that only the grapefruit trees in the experimental grove showed severe frost damage. The yield figures bear out these observations and also indicate that the damage was most severe on the grapefruit plots receiving the greatest quantity of irrigation water. The data support the recommendation made previously that winter irrigation should be limited to a minimum except where there is no danger of frost damage or where protection can be obtained by grove heating."

Supplemental Irrigation Studies - J. R. Carreker, Athens, Ga.-"A deficiency in soil moisture began to appear the first week in July because of limited rainfall the latter half of June.

"The relation between the dates of irrigation and subsequent rainfall in July illustrate the problems a farmer in the Southeast faces when irrigating.

<u>Date</u>	<u>Irrigation</u>	<u>Rainfall</u>
<u>July</u>	<u>Crop</u> <u>inches</u>	<u>inches</u>
2	Vegetables 0.5	
6	Vegetables 1.0	
7 & 8	Corn 2.0	
8 & 9	Pasture 2.0	
9		0.91
10		.33
11		.64
14		1.15
16		1.92
26	Vegetables 1.0	
27		.10
28-29	Corn 2.0	.22
29-30	Pasture 2.0	
Aug.		
1 - 4		2.53

Table 1.--Fruit yield in boxes per tree
Dr. Sample Estate Grove, Haines City, Fla.
1947-1948

		Oranges		Grapefruit*	
Irrigation :		1st Series :	2nd Series :	1st Series :	2nd Series :
Application:	Plots	Plots	Average	Plots	Average
0"	8.08	7.79	7.94	13.00	13.17
1-1/2"	9.31	9.15	9.22	13.10	10.89
2-1/2"	9.14	8.86	9.01	10.24	12.13
3-1/2"	9.29	10.60	9.93	9.23	12.13
					13.09
					12.05
					11.16
					10.68

*Trees in the grapefruit plots were damaged by the freeze of February 6, 1947, those in the irrigated plots being damaged more severely than those in the unirrigated plots.

Statistical Analysis

The difference between the yield from the orange plots receiving 3-1/2" of irrigation water per application and the yield from the orange plots receiving no irrigation is significant.

The differences in yield between individual irrigated orange plots is not significant.

The differences in yield between the grapefruit plots is not significant.

"The benefits from the applications of irrigation water during July this year were probably considerably reduced by the following rains. By contrast, during July in 1947 there was only 3/4-inch of rain and the irrigation applications were quite effective.

"Total rainfall in July was 5.27 inches, as compared to the long-time average of 5.04 inches. Evaporation from the water surface in the pan was 7.191 inches."

IRRIGATION DIVISION

Los Angeles West Coast Basin Investigations - Harry F. Blaney, Los Angeles, Calif.-"In connection with the water resources investigation of the West Coast Basin, consumptive use and rainfall penetration studies were continued by the Division in cooperation with the State Engineer of California. At the seventh conference of the Engineering Advisory Committee held in Los Angeles, the progress of the work during the past six months was reviewed, and some of the results reported by cooperating agencies are as follows: Water production records were obtained from 22 organizations; soil samples were taken at 8 rainfall penetration stations; summaries of evaporation and climatological observations during 1947 at the Chaldon Station were completed; classification of 1284 wells in the basin showed that 543 are active, 345 are not used, and 396 wells have been abandoned; a base map showing the location of 1800 wells was completed; 692 static water level measurements were made; 536 water samples were analyzed for conductivity, chlorides and bicarbonates, and water level contour maps were completed for several areas. It was also reported that the land use map of the basin would be completed in August."

Evaporation Studies - Harry F. Blaney.-"California State Bulletin No. 54-A, 'Evaporation from Water Surfaces in California', by the late Arthur A. Young, published during July 1948 by the State Division of Water Resources, presents basic data on evaporation and temperature records from some 250 pans throughout the State."

San Fernando Valley Investigations - William W. Dornan, Los Angeles, Calif.-"A survey of cropped acres is being made in connection with water table and drainage studies in the San Fernando Valley. Over-irrigation on row crops, orchards and alfalfa may be partially the cause of the excessively high water table in some of the areas. A spot survey of bean acreage reveals that there are approximately 1,100 acres of beans being irrigated at the present time."

"In one field of 150 acres of beans, the water application has been 12 inches and 16 inches, respectively, for the past two irrigations. This crop is row irrigated in 1,320 foot runs on a medium soil. Water table in the observation wells has come up from about 7 feet to 5 feet, indicating that this apparent over-irrigation is contributing to the water table problem."

"In a spot check on a 10-acre citrus orchard the owner applied 12 inches of water in an area that, it is estimated, would require about a 3- to 4-inch application to bring the top 3 feet to field capacity. The balance of the irrigation water is assumed to have percolated to the water table causing water logging down slope from this field."

Drainage of Imperial Valley Irrigated Lands - George B. Bradshaw, Imperial, Calif.-"A new silt plus clay curve in relation to permeability has been drawn up for Imperial Valley soils. The permeability samples run were horizontal in place samples and were run in either a falling or constant head permeameter. The permeabilities derived from these samples were plotted against the silt plus clay content obtained by sieve and bouyoucous analysis. The coefficient of permeability in the following table is expressed in both gallons per square foot per day and cubic centimeters per square centimeter per hour with respect to the silt plus clay content of various soils.

Gallons per square foot per day	Cubic centimeters per square centimeter per hour	Percent silt plus clay
5	1	58.0 a/
10	2	51.5 a/
20	4	39.5 a/
40	8	22.5 a/
60	12	11.5 a/
80	16	6.5 a/
100	20	5.5 b/
120	24	7.0 b/
140	28	10.0 b/
160	32	13.5 b/

a/ Soils containing sand grains predominantly smaller than 149 microns.

b/ Soils containing sand grains predominantly 149 microns or larger."

Transmission Rate Studies, Escondido-Fallbrook Soil Conservation District - V. S. Aronovici, Pomona, Calif.-"Upon request by Operations personnel, a preliminary cooperative study was made of transmission rates of representative soils in Fallbrook-Escondido work units. This program included close cooperation with the Area Soil Scientist and Work Unit Soil Technicians. Utilizing the Uhland soil sampling device together with near standard laboratory procedures, six sites were selected and sampled. A total of 70 samples were taken and returned to the Pomona Laboratory for processing. Operations technicians assisted in processing these samples in the laboratory.

"The procedure used is briefly outlined below:

1. Field weights to determine moisture content at time of sampling.
2. Transmission rates observed. The field cylinder is prepared in the conventional manner. It is then placed directly in a 16-ounce soil can. This can has a copper tube outlet at the bottom and a wire mesh screen over the bottom to allow free-flow of water from the soil cylinder. These soil cans are mounted on a rack. Under each outlet is placed a 50 or 100 ml. beaker to

catch the effluent. Time water begins to flow through the soil is recorded. Effluent is then measured at intervals depending upon the rate of flow until approximately 2 to 3 inches of water per surface square inch has passed through the sample. Usually about seven observations are made. Transmission rates in inches per hour are then calculated.

3. The sample is then allowed to drain until there is no free water on the surface. It is weighed to determine the quantity of accumulated moisture, during the transmission measurements.
4. The sample is oven-dried for volume weight determination and percent moisture by weight at the field and saturated moisture.
5. The following data are computed from these laboratory observations:
 - (a) Field moisture.
 - (b) Transmission rates in inches per hour for individual observations and averages for the entire run.
 - (c) Inches of moisture gained during transmission run.
 - (d) Average transmission rate including moisture gained during run.
 - (e) Volume weights.

"Observations of representative samples taken in the Escondido and Fallbrook areas clearly reflect the character of the soil profiles."

Further information on transmission rate studies is given in the table on page 24.

Howard Maughan reports that field work on his study is now being conducted in the Lewiston-Preston area, extending across the Utah-Idaho State line in the Cache County, Utah, and Franklin, Idaho. "The objectives of this study are:

- (1) To assemble, interpret and report data concerning the management of related irrigation and drainage enterprises.
- (2) To find possibilities of increasing efficiencies and economies in the management of irrigation water storage, conveyance, control and distribution; and in the drainage and reclamation of irrigated lands.

"Preliminary work done on this project reveals that management problems in connection with small related irrigation and drainage enterprises are of major concern in a number of western states. In Utah and other states, many small, weak enterprises exist. Often several small irrigation enterprises serving a unit area receive water from a common source and other conditions affecting irrigation and drainage throughout the area may be closely related.

Soil type	Depth	Transmission rate	Cultural practice
	Inches	(averaged) Inches per hour	
1. Marriam sandy loam (3L)	0-3 6-9 12-15 18-21	4.80 0.75 0.05 0.03	Permanent cover crop
2. Escondido very fine sandy loam (1)	0-3 10-13 17-20	0.48 0.44 3.68	Permanent cover crop
3. Fallbrook sandy loam (6L)	0-3 10-13 13-16 25-28	4.07 2.39 8.84 7.45	Heavy permanent cover crop
4. Fallbrook sandy loam	0-3 6-9 10-13 18-21	22.40 1.07 6.02 7.14	Loose surface soil, clean cultivated. (Note effect on plow sole)
5. Ramona sandy loam (2L)	3-6 6-9 12-15	0.39 0.33 0.20	Clean cultivated
6. Vista sandy loam (5L)	0-3 14-17 33-36	3.20 5.15 1.45	Permanent cover crop

"The multiplicity of small enterprises organized to save unit areas resulted largely from the 'piecemeal' nature of land settlement and the 'pick and shovel' methods of irrigation and drainage development employed in early days. Such organization is often neither adapted to the efficient conservation of water and land resources nor to the best interests of the water users.

"There are, undoubtedly, many opportunities in the west to improve water conservation through a consolidation of irrigation and drainage enterprises."

C. W. Lauritzen reports good progress on field canal linings at North Logan and Richmond. The cooperative research on materials for canal linings being conducted by the SCS, the Utah Agricultural Experiment Station and the U. S. Bureau of Reclamation is well under way. The detail of progress during the month follows:

"Routine permeability measurements on the linings in Channels A and B were continued. Some spot checks with a constant head permeameter indicated that the seepage through the bed of the channel was much smaller in proportion than that through the lining as a whole, leading to the conclusion that losses were heavier through the sides than through the bottom of the channel. A comparison of seepage losses from canals determined by the ponding method and with the constant and variable head permeameters gave similar results. It was believed that this difference can be attributed to the fact that there is some siltation on the bottom tending to decrease permeability in the channel bed while the sides are subject to some scouring.

"The following experimental linings were installed in Channel C:

1. Trenton sandy loam - 100 parts, Redmond Bentonite - 10 parts.
2. Oasis silt loam.
3. Trenton sandy loam - 100 parts, Henrieville - 10 parts.
4. Millville silt loam - 100 parts, Redmond Bentonite - 5 parts.
5. Sale Lake silt loam - 100 parts, Bentonite - 5 parts.
6. Earth material used for lining on the Provo River Reservoir Canal. Sample 1-BR-4.
7. Earth material used for lining on the Provo River Reservoir Canal. Sample 1-BR-4.
8. Earth material used for lining on the Provo River Reservoir Canal. Sample L-BR-3.

"In this channel a subgrade of sand filled pea gravel was substituted for the gravel mat used in Channels A and B, and all linings covered with a 3-inch layer of gravel to protect them against erosion and minimize the extent of drying which would take place when water is out of the channel. Water was turned into Channel C July 26, 1948.

"Installation of the following linings at North Logan were completed:

1. Butyl coated fiberglass.
2. Precast concrete slabs.
3. Half round concrete pipe ditch liners.
4. Earth stabilized with sodium silicate.

"The slope of this channel is approximately 2-1/4 feet per hundred. With a stream of approximately 2 cfs., surface velocities ranged from 8 to 10 cfs. A test run was made. All linings performed satisfactory except the section of earth stabilized with Sodium Silicate. Sufficient erosion took place to demonstrate that this treatment is unsatisfactory for material used and the velocities encountered.

W. C. Barrett reports continued difficulty in getting materials for use in making or repairing over-snow vehicles. In spite of this considerable progress is being made in the reconstruction of the two machines that were field tested last year. Bogie wheels and bearing supports are being made of aluminum to reduce weight.

Orthodox design of drives and sprockets will not work under icing conditions. The supporting power of snow varies so widely that the range of design for power and speed must be wide.

Plans for the Research equipment laboratory shop are progressing. The space to be occupied by the shop will be vacated later this fall and until then the work will be carried out in temporary quarters.

Carl Rohwer, Fort Collins, Colorado.-"Four new snow courses were established by Mr. Stockwell on the headwaters of the Conejos River in the San Luis Valley at the request of the Bureau of Reclamation. The data collected from these courses are to be used in connection with the Platoro Reservoir Project. Plans were made to get records from the Summitville Course, which had to be discontinued last year because of lack of observers in the area. Consideration is being given to the establishment of 7 new snow courses on the North and South Platte River watersheds. These new courses have been requested by the Bureau of Reclamation, Region 7. Mr. Stockwell completed the transcript of The Colorado River Forecast Committee meeting and mailed copies to the men who attended the meeting."

Stephen J. Mech, Prosser, Washington.-"The potatoes planted in June were side dressed with 90 pounds nitrogen and 40 pounds phosphorous per acre on July 20-21. This was followed by the first cultivation of the season.

"On July 27 the first irrigation was started on the 'wet' plots (75 percent available moisture). The medium moisture plots (60 percent available moisture) were irrigated a few days later.

"The surface soil was loose and dry at the time of the irrigation and erosion losses were heavy. The infiltration was surprisingly small. It took 24-36 hours to add 4 inches of water to the plots on the 7 percent slope. This was surprising in view of the heavy stand of alfalfa that was turned under for the potatoes. The infiltration is now only 1/2 to 1/3 of that measured earlier in the season while the alfalfa was still standing.

"The potatoes are now in bud and irrigation testing will be practically continuous until harvest. In view of the low infiltration on the steeper slopes it seems that it may require almost continuous irrigation on the 'wet' plots to maintain the average moisture above the established 75 percent.

"I prepared a rough draft of part of a joint paper 'Factors Influencing Erosion on Irrigated Land,' to be presented at the American Society of Agronomy at Fort Collins on August 24 to 27. Mr. A. W. McCulloch, Chief, Irrigation Section, Soil Conservation Service, Portland, is to present the Operations viewpoint. He will also make the informal presentation of the paper at the meeting."

Clyde E. Houston.-"Contacts have been made with interested water users and government agencies in regard to initiating water supplies forecast meetings throughout the Humbolt Basin to begin in April 1949.

"Accompanied by Mr. Frost additional snow course locations were visited on the headwaters of the Owyhee and Northern Great Basin in Nevada. Such courses were requested by the Nevada State Engineer to assist with their water allocations on Quinn River and McDermitt Creek in Nevada. Mr. Frost believes that these will assist with his Owyhee River forecasts. Present plans are to establish the required courses during the month of October."

Assistance to Soil Conservation Service Operations - Wayne D. Griddle, Boise, Idaho.-During the month Mr. Griddle attended and assisted in conducting two irrigation schools in Region 5 for the Soil Conservation Service. One training school held at Scottsbluff, Nebraska during the week of July 12 was attended by approximately 40 Soil Conservation Service engineers from the states of Kansas, Nebraska, Wyoming, and South Dakota.

The other school held during the week of July 26 at Glendive, Montana included the rest of the engineers from Region V. These engineers came mostly from the states of Montana, northern Wyoming, and North Dakota. At both of these meetings the work of the Division of Irrigation, Soil Conservation Service was explained and a method of determining size of irrigation stream and the length of run for various soils and slopes was demonstrated.

Dean W. Bloodgood, Austin, Texas.-"During the month most of the streams have been at very low water stage and some have dried up entirely, with the exception of standing water in holes. The drouth in most parts of Texas continues to be serious as far as stream flow is concerned. The Brazos River, one of the larger streams of Texas, is at the lowest water stage I have seen it in my 9 years residence in this state. The waters from the small stream flow contains practically no silt - only a small amount of alga. The rains that fell during local showers have benefited the crops and the cotton and corn crops look good. All of the rains with few exceptions have been absorbed by the soils, and there has been very little runoff from the watershed areas to cause much erosion and silt in Texas streams."

Storage of Water Underground (Water Spreading) - A. T. Mitchelson, Berkeley, Calif.-As an antibiotic one of the Kern County ponds was given an application of potato vines during the month. This treatment is now undergoing a 30-day incubation period in a moist condition and while the vines are still green prior to actual spreading operations in order to make the treatment comparable with that when cotton-boll hulls were used on other ponds.

At the request of the Los Angeles County Flood Control District, Mitchelson and Muckel conferred with Messrs. Lavery and Jordon, engineers of the District, regarding some of the water-spreading problems of the District. They have been carrying on some spreading activities in stream beds, but are now contemplating expansion of their work. In most of their areas, they have been spreading over rather porous soils, not comparable with our San Joaquin County soils. In the work they are now contemplating they are going to use rectified sewage water and because of the chemical or physical reaction which might result, they were anxious to know of our experience in various treatments of water and soils. This idea of salvaging effluent sewage is awakening state-wide interest and we have had several conferences with State sanitation engineers regarding anticipated complications in percolation rates, particularly where industrial wastes are present.

Irrigation Practices, Upper Santa Ana River Area, San Bernardino County, Calif. - Dean C. Muckel, Pomona, Calif.-Five series of soil-moisture samples were taken in the Beaumont Fruit Co. peach orchard near Yucaipa during July. Sampling has been carried on here since April 26, when the regular summer irrigation schedule was begun. Preliminary analysis of the data indicates the major root activity to be in the top three feet with very little soil-moisture extractions in the 4th, 5th, and 6th foot depths. In so far as this particular study is concerned, the

amount of irrigation water penetrating below the root zone is the item desired. To do this it was first necessary to determine the depth of the root zone. During the spring and early summer months the data indicates some deep penetration. This may not be true for the maximum growing period and warmer weather in August.

One and one-half acre-inches of irrigation water per acre was applied every 14 days. Owing to the dry winter, an extra irrigation was given and the soil moisture throughout the orchard was at a high level at the start of the summer schedule.

9-27-48

